October 6, 1960

Dr. A. Lwoff
Institut Pasteur
25, Rue du Docteur Roux
Paris, France

Dear Lwoff:

Our evidence for thinking that the increase in DNA polymerase activity induced by T2 phage infection is a protein distinct from pre-existing coli polymerase is twofold. First, antiserum prepared against polymerase purified from E. coli completely neutralizes this purified polymerase as well as comparable amounts of activity in extracts of normal cells. It neutralizes 10% or less of the polymerase activity in extracts of T2 phage infected cells. Second, the augmented polymerase activity of phage infected cells (about 90% of the total) requires the addition of heat denatured DNA to the assay mixture in order for its detection. By contrast, the polymerase activity in extracts of normal E. coli shows little or no stimulation by the addition of such a primer. Recently we have begun to fractionate the polymerase activity from phage infected cells and there are indications that it behaves differently from what we would expect of the polymerase activity in extracts of normal cells. While this evidence has encouraged us to think there is and to look for a distinctive protein, I doubt that it can be considered proof of the existence of a distinctive protein. It is conceivable that nucleic acid and protein constituents in the phage infected cell react with and modify the behavior of polymerase.

I made these observations this summer and I am happy to have you use them and interpret them in any way that you would like. Dr. H. V. Aposhian, a postdoctoral fellow working under my direction, is pursuing the purification of the phage induced polymerase and I will let you know if we achieve any further clarification of the problem.

In a more speculative vein, I have taken this evidence and that reported by Bessman, formerly associated with our group(BBRC 1:101, 1959), on deoxyguanylate kinase to mean that there is, upon T2 infection, an abrupt and complete immobilization of host DNA both with regard to its capacity to serve as primer for future DNA replication and for information transfer for new protein synthesis. Thus in the case of the augmentation of levels of pre-existing activities, as well as in the development of new enzyme activities, totally new proteins are formed which may or may not resemble

those previously produced in response to the host DNA. I am guessing that this kind of thinking is in keeping with ideas that you and Jacob have developed independently from genetic lines of evidence.

With kindest regards,

Sincerely yours,

Arthur Kornberg

AK:es